## REMARKS

Upon entry of this amendment, claims 1, 3-24,26-28, 30-32, 34-36 and 38-40 will be pending in the application, of which claims 1, 4, 12, 13, 14, 18, 21, 22, 24, 28 and 36 are being amended.

Independent claims 1, 24, and 28 are being amended to recite directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal by injecting a pressurized gas into the process zone to direct the liquefied metal into the sputtered depression, thereby forming a coating comprising the metal in the sputtered depression.

Claim 36 is being amended to recite directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal by inserting a consumable metal wire into the process zone to at least partially liquefy the consumable metal wire in the process zone to form liquefied metal that is directed into the sputtered depression of the deposition target by the plasma jet to at least partially fill the sputtered depression with the liquefied metal.

Claims 4, 12, 18, 21 and 22, which depend from claim 1, are amended to recite "deposition target", which is consistent with claim 1. Claim 12 is also being amended to remove redundant language. Claims 13 and 14 are being amended to recite "metal layers", which is consistent with claim 12. These amendments are supported at least by claims 1, 24, 28 and 36 as filed.

The claim amendments add no new matter, and were previously in the claims, thus, entry of the amendments is respectfully requested.

**Claim Rejections**

I. Claims 1, 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36, and 38-40 were rejected under 35 U.S.C. § 102(b) as anticipated by Vukanovic et al (U.S. Patent No. 4,505,947).

In order to anticipate a reference, each and every element of the claim must be disclosed by a single prior art reference. W. L. Gore & Assocs. v. Garlock, Inc., (Fed Cir. 1983), cert. denied, 469 U.S. 851 (1984).

Claim 1 is to a method of refurbishing a deposition target having a pre-sputtered surface with a sputtered depression, the method comprising providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone; generating an electrical arc in the process zone; inserting a consumable metal wire into the process zone to form liquefied metal; and directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal by injecting a pressurized gas into the process zone to direct the liquefied metal into the sputtered depression, thereby forming a coating comprising the metal in the sputtered depression.

Vukanovic et al. does not anticipate claim 1 because Vukanovic et al. does not teach each and every element of claim 1. For example, Vukanovic et al. does not teach the claimed step of providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone. A pre-sputtered deposition target is a target that has already been used in a sputtering process. Providing a pre-sputtered surface of a deposition target means providing a surface of a target that has already been sputtered, and which has a sputtered depression that resulted from this pre-sputtering step. Vukanovik et al. does not teach this step of providing a deposition target, and further does not

teach providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone.

Instead, Vukanovik et al. teaches the step of providing an entirely different substrate, which is not a deposition target, and not a pre-sputtered deposition target. Vukanovik et al. teaches:

> "Substrates which may be coated include conductive or non-conductive substrates for semiconductor applications, and glass microballoons utilized as nuclear fuel targets for inertial confinement fusion processes."

(Vukanovic et al., Column 1, lines 14-18) Vukanovic et al. further teaches that:

> "Coated substrates may be produced which include semiconductors, photovoltaic thin films, fusion target pellets or coated microballoons, high tolerance bearings and protective coatings such as passivation layers (SiN2). Accordingly, substrates to be utilized may include glass microballoons, quartz, glass, or conductive metals such as aluminum, stainless steel, and the like."

(Vukanovic et al., Column 4, lines 37-43) The substrates taught by Vukanovic et al. include semiconductor and photovoltaic devices, and spherical substrates such as fusion target pellets and high tolerance bearings, none of which are the same as a pre-sputtered deposition target. Thus Vukanovic et al. does not teach the positively recited step of providing a pre-sputtered surface of the deposition target comprising the sputtered depression in a process zone, as claimed in claim 1, and consequently, Vukanovic et al. does not teach each and every element of claim 1. Therefore, Vukanovic et al. does not anticipate claim 1.

For the same reasons, Vukanovic et al. does not anticipate independent claims 24, 28, 32 and 36, which all recite "providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone."

Furthermore, Vukanovik et al. also does not teach the step of "directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal...", as claimed in claim 1. Instead, Vukanovic et al. teaches coating various entirely different substrates such as devices and pellets with a coating. Coating a substrate is not the same as the step of directing liquefied metal into the sputtered depression of a deposition target to at least partially fill the sputtered depression as claimed. Thus Vukanovic et al. does not teach all of the elements of claim 1, and therefore, does not anticipate claim 1.

For the same reasons, the 102(b) rejection of claims 24, 28, 32 and 36, which contain similar language, should be withdrawn.

**Claim Rejections under 35 USC § 103(a)**

II. Claims 1, 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36, and 38-40 were also rejected under 35 U.S.C. § 103(a) as obvious over Vukanovic et al.

The Advisory Action suggests that Vukanovic et al. renders claim 1 obvious under KSR International Co. v. Teleflex Inc., 550 U.S. – 82 USPQ2d 1385 (2007), because "... the use of known technique to improve similar devices in the same way is obvious to one of ordinary skill."

However, Applicant respectfully disagrees because Vukanovic et al. clearly does not teach or suggest the benefits of the present invention. Vukanovic et al. teaches coating conductive or non-conductive substrates for semiconductor applications, and glass microballoons utilized as nuclear fuel targets for inertial confinement fusion processes. However, Vukanovic et al. does not teach or suggest the benefits of refurbishing a deposition target having a pre-sputtered surface by filling in a sputtered depression on the surface of the

pre-sputtered target. As described in the Background section of the present Specification:

> In these sputtering processes, certain regions of the target are often sputtered at higher sputtering rates than other regions resulting in uneven sputtering of the target surface. Uneven target sputtering can arise from the complex contoured magnetic field maintained about the target to confine or stir energized gas ions about the target surface. Uneven sputtering can also be related to differences in grain size or structure of the target material, chamber geometry, and other factors. Uneven sputtering of the target forms sputtered depressions in the target such as pits, grooves, race-track like trenches, and other recesses, where material has been sputtered from the target at a higher rate than the surrounding areas. The development of these depressions can be undesirable because very deep features can penetrate the target to expose chamber components, such as backing plates, behind the target. Sputtering from the backing plate can contaminate the substrate being processed. Recessed features that are very large or very deep can also affect the deposition uniformity of sputtered material on the substrate.
>
> Accordingly, unevenly sputtered targets are typically removed after processing of a predefined number of substrates and before the uneven sputtered depressions become too deep or wide. The sputtering target is then discarded, or more typically, re-used when the target material is expensive or has a high purity level that is difficult to obtain. For example, the target can be re-used by melting down the sputtered target material and shaping a new sputtering target. However, melting down and re-shaping the target is costly because it requires re-forming the entire target.

(Background, page 2, line 22 to page 3, line 8.) The process as claimed in the present claims provides an efficient and cost-effective method of refurbishing a used deposition target which does not require discarding the used target, or melting down the used target and shaping a new sputtering target. It also allows

flexibility in terms of materials for filling various shapes and sizes of sputtered depressions of the previously sputtered surfaces commonly occurring in the refurbishment of targets. Further, the claimed process provides low contamination levels of target material because the metals are liquefied and deposited right before entering the depressions of the sputtering target.

These benefits and advantages of the claimed process are not taught or suggested by the coating processes taught by Vukanovic et al. Furthermore, the advantages and benefits provided by the claimed target refurbishment processes, are not obvious to one of ordinary skill in the art from a process of coating substrates for semiconductor applications or glass microballoons as taught by Vukanovic et al. Coating entirely different substrates for different purposes do not render obvious a process of filling a sputtered depression on a used deposition target. Further, one of ordinary skill would not think of refurbishing a deposition target by at least partially filling sputtered depressions based on teachings to coating entirely different structures.

Furthermore, an obviousness rejection requires that prior art references, when combined, teach or suggest the invention as a whole. Prior art references that are combined must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). In making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention "as a whole." Princeton Biochemicals, Inc. v. Beckman Coulter, Inc. (Fed. Cir., No. 04-1493, 6/9/05).

Vukanovic et al. does not teach or suggest claim 1 as a whole, because Vukanovic et al. does not teach or suggest the steps recited in the claim. For example, Vukanovic et al. does not teach the claimed step of providing a pre-sputtered surface of the deposition target comprising a sputtered depression, in a process zone, as claimed in any of claims 1, 24, 28, 32 and 36.

A deposition target has a specific structure for use as a source in a sputtering process. Providing a used target having a pre-sputtered surface allows the benefits of filling the sputtered away depressions on the surface of the target. Vukanovik et al. does not teach or suggest such a step, and instead teaches coating different substrates for different reasons. Thus Vukanovic et al. does not teach or suggest the step of providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone, as claimed in any of claims 1, 24, 28, 32 and 36.

Vukanovic et al. also does not teach the step of directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, as claimed in claims 1, 24, 28, 32 and 36. Instead, Vukanovic et al. teaches applying a coating to form semiconductors, photovoltaic thin films, fusion target pellets or coated microballoons, as explained above. Vukanovic et al.'s teachings to coating a semiconductor substrate or fusion target pellets with a coating are not the same as the step of directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression as claimed.

For these reasons, Vukanovic et al. does not teach or suggest, and therefore does not render obvious claims 1, 24, 28, 32 and 36, or the claims dependent therefrom, which contain similar language.

For these reasons, the obviousness rejection of dependent claims 3-7, 12-14, 18-20, 24, 26-28, 30-32, 34-36 and 38-40, should be withdrawn.

III. The Office Action further rejected claims 8-9 and 15 under section 103 (a) as unpatentable over Vukanovic et al.

Claims 8-9 and 15 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. because Vukanovic et al. does not teach or suggest the

step of "providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone". Nor does Vukanovic et al. teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal, as claimed in claim 1. Thus Vukanovic et al. does not teach claim 1 as a whole, or claims 8-9 and 15 which depend therefrom.

Further, Vukanovic et al. does not motivate derivation of the present claims because Vukanovic et al. does not teach or suggest the advantages and benefits provided by the present process described above. The claimed process provides an efficient and cost-effective method of refurbishing a pre-sputtered surface or a deposition target with metal. It also allows a range of materials to be used to fill the pre-sputtered surfaces. Further, the process reduces contamination levels of the target material because it is liquefied and deposited right into the depressions of the sputtering target. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al.

For these reasons, claims 8-9 and 15 are not obvious over Vukanovic et al.

IV. The Office Action rejected claims 10-11 and 16-17 under section 103 (a) as unpatentable over Vukanovic et al., and further in view of Wu et al. (USPG Publication no. 2003/0102207)

Claims 10-11 and 16-17 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. and Wu et al. because neither reference teaches or suggest "providing the pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone" as claimed. Vukanovic et al. teaches a substrate 43, which in Example 1 is described as a flat quartz substrate. A quartz substrate is not a target that is sputtered or which has

depressions formed by sputtering. Nor does Vukanovic et al. teach or suggest that the quartz substrate has sputtered depressions that should be filled. Vukanovic et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the target to at least partially fill the sputtered depression with the liquefied metal as claimed. Thus Vukanovic et al. does not teach claim 1 as a whole.

Wu et al. does not make up for the deficiencies of Vukanovic et al. because Wu et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed. Instead Wu et al. teaches a method of producing nano powders (Abstract).

Further, neither Vukanovic et al. nor Wu et al. teach or suggest the advantages and benefits provided by the present process, namely, the ability to fill in sputtered depressions in a deposition target which are sputtered off at higher sputtering rates than other regions in sputtering processes, to extend the life of a deposition target without re-melting or reforming the target. In many deposition processes, uneven sputtering of the target surface can significantly reduce target life. Moreover, the depressions can have depths or other dimensions that vary across the target surface making it difficult to uniformly fill these depressions. The claimed process fills these depressions on the deposition target in an efficient, controllable, and cost-effective method. It also allows refurbishing of a pre-sputtered surface with metal without excessive contamination. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al. or Wu et al..

For these reasons, claims 10-11 and 16-17 are not obvious over Vukanovic et al. and Wu et al.

V. The Office Action further rejected claims 21-23 under section 103 (a) as unpatentable over Vukanovic et al., and further in view of Lee et al. (US patent no. 7,192,235).

Claims 21-23 all depend upon claim 1. Claim 1 is not obvious over Vukanovic et al. and Lee et al. because neither reference teaches or suggests providing a pre-sputtered surface of the deposition target comprising the sputtered depression, in a process zone. Vukanovic et al. teaches a substrate 43 which in Example 1 is a flat quartz substrate – which is not a deposition target and is not used for sputtering material. Nor does the Vukanovic et al. teach or suggest that the quartz substrate has sputtered depressions that should be filled. Vukanovic et al. also does not suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal to refurbish the target as claimed. Thus Vukanovic et al. does not teach claim 1 as a whole.

Lee et al. does not make up for the deficiencies of Vukanovic et al. because Lee et al. also does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed. Instead Lee et al. teaches a method and apparatus for chemically, mechanically, and/or electrolytically removing material from a microelectronic substrate. (Abstract.) A process for removing material from a microelectronic substrate is not the same as a process for refurbishing a deposition target. Further, Lee et al. describes a process for removing material from the microelectronic substrate rather than filling depressions on the substrate. Clearly, Lee et al. does not teach or suggest directing liquefied metal into the sputtered depression of the deposition target to at least partially fill the sputtered depression with the liquefied metal as claimed.

Further, neither Vukanovic et al. nor Lee et al. teach or suggest the advantages or desirability of filling sputtered depressions on a deposition target

which are formed when the deposition target is sputtered. Nor do the cited references recognize that a sputtered target has regions which are sputtered at higher sputtering rates than other regions, and which when filled with material, can extend the life of a deposition target. Further, the cited references do not recognize the advantages of the claimed process for filling depressions which have depths or other dimensions that vary across the deposition target surface, making it even more difficult to uniformly fill these depressions. The claimed process fills these depressions on the deposition target in an efficient, controllable, and cost-effective method. The process also allows refurbishing a pre-sputtered surface. These benefits and advantages of the claimed process are not taught or suggested by Vukanovic et al. or Lee et al.

For these reasons, claims 21-23 are not obvious over Vukanovic et al. and Lee et al.

## CONCLUSION

Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone the undersigned representative at: (415) 538-1555.

Respectfully submitted,
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